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Process of and device for machining ball hubs

Claims

1. A process of machining inner joint parts (11) of constant velocity universal ball joints, which inner joint parts (11) comprise a longitudinal axis (A) and at least one guiding face by means of which the inner joint part (11) is orbitally angularly movably guided in a ball cage, and which comprise a plurality of ball tracks (12) which are distributed around the circumference of the guiding face and which ball tracks divide the guiding face into a corresponding plurality of guiding webs (13) and in which ball tracks torque transmitting balls can be held so as to be longitudinally displaceable,

   characterised in

   that one ball track (12) and at least one guiding web (13) are machined simultaneously.

2. A process according to claim 1,

   characterised in

   that in the case of uneven numbers of ball tracks (12) and guiding webs (13), one ball track (12) and one radially opposed guiding web (13) each are machined simultaneously.

3. A process according to claim 1,

characterised in

that in the case of even numbers of ball tracks (12) and guiding webs (13), one ball track (12) and one guiding web (13) adjoining the radially opposed ball track each are machined simultaneously.

4. A process according to any one of claims 1 to 3,

characterised in

that two ball tracks (12) and two guiding webs (13) each are machined simultaneously.

5. A process according to any one of claims 1 to 3,

characterised in

that two ball tracks (12) - more particularly two ball tracks positioned in planes extending parallel relative to one another - are simultaneously machined in the longitudinal direction synchronously and at least one guiding web (13) is machined at least partially simultaneously therewith.

6. A process according to claim 5,

characterised in

that two ball tracks positioned in planes extending parallel relative to one another are machined by jointly driven tools (23, 24).

7. A process of machining inner joint parts (11) of constant velocity universal ball joints, which inner joint parts (11) comprise a longitudinal axis (A) and are provided with at least one guiding face by means of which the inner joint part (11) is guided orbitally angularly movably guided in a ball cage and which comprise a plurality of ball tracks (12) which are distributed around the circumference of the guiding face, which ball tracks divide the guiding face into a corresponding number of guiding webs (13) and in which ball tracks torque transmitting balls are held so as to be longitudinally displaceable,

characterised in

that at least two ball tracks (12) are machined simultaneously in the longitudinal direction.

8. A process of machining inner joint parts (11) of constant velocity universal ball joints, which inner joint parts (11) comprise a longitudinal axis (A) and are provided with at least one guiding face by means of which the inner joint part (11) is guided orbitally angularly movably in a ball cage and which comprise a plurality of ball tracks (12) which are distributed around the circumference of the guiding face, which ball tracks divide the guiding face into a corresponding number of guiding webs (13) and in which ball tracks torque transmitting balls are held so as to be longitudinally displaceable,

characterised in

that at least two guiding webs (13, 13′) are machined simultaneously in the longitudinal direction.

9. A process according to any one of claims 7 or 8,

characterised in

that, in the case of uneven numbers of ball tracks (12) and guiding webs (13), a first ball track (12) or web face (13) and the second ball track (12′) or guiding web (13′) adjoining the radially opposed web face or ball track each are machined simultaneously.

10. A process according to any one of claims 7 or 8,

characterised in

that, in the case of even numbers of ball tracks (12) and guiding webs (13), two radially opposed ball tracks (12, 12′) or guiding webs (13, 13′) each are machined simultaneously.

11. A process according to any one of claims 1 to 10,

characterised in

that the ball tracks (12) are machined by rotating tools (21,22,23,24) whose axes of rotation (R) perpendicularly cross the longitudinal axis (A) of the inner joint part (11) and whose centre is guided in radial planes (X) which, relative to the inner joint part (11), extend through the longitudinal axis (A).

12. A process according to any one of claims 1 to 10,

characterised in

that the ball tracks (12) are machined by rotating tools whose axis of rotation extends substantially radially relative to the longitudinal axis (A) of the inner joint part (11), wherein the axis of rotation, relative to the inner joint part (11), is guided in radial planes extending through the longitudinal axis (A) of the inner joint part (11). (No Figure).

13. A process according to any one of claims 1 to 12,

characterised in

that the guiding webs (13) are machined by rotating tools (31,32,33) whose axis of rotation (R) perpendicularly crosses the longitudinal axis (A) of the inner joint part and whose centre is guided in radial planes which, relative to the inner joint part (11), extend through the longitudinal axis (A).

14. A process according to claim 13,

characterised in

that the guiding webs (13) are machined by rotating tools whose centre, relative to the inner joint part (11), additionally carries out pivot movements around its longitudinal axis (A).

15. A device for machining inner joint parts (11) of constant velocity universal ball joints, which inner joint

parts (11) comprise a longitudinal axis (A) and at least one guiding face by means of which the inner joint part (11) is orbitally angularly movably guided in a ball cage, and which comprise a plurality of ball tracks (12) which are distributed around the circumference of the guiding face and which ball tracks divide the guiding face into a corresponding plurality of guiding webs (13) and in which ball tracks torque transmitting balls can be held so as to be longitudinally displaceable,

characterised in

that it comprises clamping means for an inner joint part (11) and at least two rotating tools (21, 31) for simultaneously machining at least one ball track (12) and at least one guiding web (13).

16. A device for machining inner joint parts (11) of constant velocity universal ball joints, which inner joint parts (11) comprise a longitudinal axis (A) and at least one guiding face by means of which the inner joint part (11) is orbitally angularly movably guided in a ball cage, and which comprise a plurality of ball tracks (12) which are distributed around the circumference of the guiding face and which ball tracks divide the guiding face into a corresponding plurality of guiding webs (13) and in which ball tracks torque transmitting balls can be held so as to be longitudinally displaceable,

characterised in

that it comprises clamping means for an inner joint part (11) and at least two rotating tools (21, 22) for simultaneously machining two ball tracks (12, 12') in the

longitudinal direction.

17. A device for machining inner joint parts (11) of constant velocity universal ball joints, which inner joint parts (11) comprise a longitudinal axis (A) and at least one guiding face by means of which the inner joint part (11) is orbitally angularly movably guided in a ball cage, and which comprise a plurality of ball tracks (12) which are distributed around the circumference of the guiding face and which ball tracks divide the guiding face into a corresponding plurality of guiding webs (13) and in which ball tracks torque transmitting balls can be held so as to be longitudinally displaceable,

characterised in

that it comprises clamping means for an inner joint part (11) and at least two rotating tools (31, 32) for simultaneously machining two guiding webs (13, 13') in the longitudinal direction.

18. A device according to any one of claims 16 to 17,

characterised in

that the clamping means for an inner joint part (11) comprise at least feeding elements to ensure feeding in the longitudinal direction (Z) of the inner joint part and that the at least two rotating tools comprise feeding means to ensure feeding only in the radial direction relative to the longitudinal direction of the inner joint part.

19. A device according to any one of claims 15 to 18,

characterised in

that the axes of rotation (R) of all rotating tools which simultaneously engage the inner joint part (11) are positioned in a common plane.

20. A device according to claim 19,

characterised in

that the axes of rotation (R) of the rotating tools are positioned at least in two parallel planes, wherein more particularly tools for dressing the guiding webs are positioned in a second common plane.

21. A device according to any one of claims 15 to 20,

characterised in

that the clamping means of the inner joint part (11) additionally comprise adjusting means for rotatingly adjusting the clamping means around the longitudinal axis (A) of the inner joint part (11).

22. A device according to any one of claims 15 to 21,

characterised in

that the rotating tools (21,22,23,24) for the ball tracks (12) are disc tools whose axes of rotation cross the longitudinal axis (A) of the inner joint part (11) at a distance from one another.

23. A device according to any one of claims 15 to 21,

characterised in

that the rotating tools for the ball tracks are finger tools whose axes of rotation are aligned substantially radially relative to the longitudinal axis (A) of the inner joint part (11).

24. A device according to any one of claims 15 to 23,

characterised in

that the rotating tools (31,32,33) for the guiding webs (13) are disc tools whose axes of rotation cross the longitudinal axis (A) of the inner part (11) at a distance from one another.

25. A device according to any one of claims 15 to 24,

characterised in

that the clamping means for the inner joint part (11) clamp in the latter axially.

26. A device according to any one of claims 15 to 25,

characterised in

that there are provided adjusting means for rotatingly adjusting the rotating tools around the longitudinal axis (A) of the inner joint part (11).